

REMARKS

Claims 53-86 are pending: Claims 1-52 and 64-74 were previously cancelled. Applicants reserve the right to pursue original and other claims in this and in other applications.

Claims 53, 59-63, and 81 have been amended to more fully define the claimed invention. No new matter has been added.

Claims 53-61, 63, and 75-86 stand rejected under 35 U.S.C. 102 as being anticipated by Collins et al., U.S. Patent No. 5,888,414 ("Collins"). Reconsideration is respectfully requested.

Claim 53 recites an "apparatus for aspect controlled selective etching comprising: a plasma etching chamber for conducting a plasma etch and comprising an electrode for applying a DC bias voltage to a supported substrate and a coil for generating an RF field; a radio frequency supply source for applying an RF voltage to said coil to generate a plasma within said chamber; and a bias voltage modulator for applying a modulated DC bias voltage to one of said supply source and said bias voltage which varies between a first voltage and a second voltage, said bias voltage modulator configured to modulate said first voltage being at a level which ensures the deposit of material onto a first location of a substrate supported by said electrode while a second location of said substrate is etched, and said second voltage being at a level at which ensures that both first and second locations of said substrate are etched."

Claim 75 recites an "apparatus for selective etching of a substrate, comprising: an etching chamber having an electrode for supporting a substrate having an opening, and a coil for generating an RF field; and a bias voltage modulator for modulating one of a DC bias voltage of said electrode and a voltage for generating said

RF field between a first voltage and a second voltage while processing the substrate, wherein said modulator is configured to modulate the voltage such that material is deposited at a first position of said opening which has a first aspect ratio, while a second position of said opening having a second aspect ratio, different from said first aspect ratio, is etched."

Claim 81 recites an "apparatus for selective etching of a substrate, comprising: an etching chamber having an electrode for supporting a substrate; and a bias voltage modulator for modulating a DC bias voltage on said electrode between a first voltage and a second voltage while etching a self-aligned contact opening in the substrate, wherein in use said voltage modulator is configured to control deposition of material at a first position of said opening which has a first aspect ratio, while etching a second position of said opening which has a second aspect ratio."

Collins fails to teach or suggest the limitations of independent claims 53, 75, and 81. The Office Action previously asserted that:

The limitation of etching rate and deposition rate and deposition rate being different on different location (depends upon aspect ratio) due to bias modulation at different levels is an intended use (functional limitation) of the structural facilities provided by the apparatus disclosed by Collins et al. Claimed process is however known from the prior art as discussed below. Further, as discussed earlier, operating parameters claimed are intended use limitations, the apparatus is disclosed capable of supporting.

Office Action, p. 3.

With respect to claim 53, Collins fails to disclose or suggest a "first voltage being at a level which ensures the deposit of material onto a first location of a substrate supported by said electrode while a second location of said substrate is etched." As such, Collins fails to disclose or suggest a "bias voltage modulator configured to

modulate said first voltage being at a level which ensures the deposit of material onto a first location of a substrate supported by said electrode while a second location of said substrate is etched" and "said second voltage being at a level at which ensures that both first and second locations of said substrate are etched."

Therefore the rejection of claim 53 and its dependant claims 54-63 should be withdrawn and the claims allowed over Collins for at least the reasons noted.

Similarly with respect to claim 65, Collins fails to disclose or suggest "a bias voltage modulator for modulating one of a DC bias voltage of said electrode and a voltage for generating said RF field between a first voltage and a second voltage while processing the substrate" and "said modulator is configured to modulate the voltage such that material is deposited at a first position of said opening which has a first aspect ratio, while a second position of said opening having a second aspect ratio, different from said first aspect ratio, is etched." Therefore the rejection of claim 75 and its dependant claims 76-80 should be withdrawn and the claims allowed over Collins for at least the reasons noted.

Similarly with respect to claim 81, Collins fails to disclose or suggest "a bias voltage modulator for modulating a DC bias voltage on said electrode between a first voltage and a second voltage while etching a self-aligned contact opening in the substrate" and wherein in use "said voltage modulator is configured to control deposition of material at a first position of said opening which has a first aspect ratio, while etching a second position of said opening which has a second aspect ratio." Therefore the rejection of claim 81 and its dependant claims 82-86 should be withdrawn and the claims allowed over Collins for at least the reasons noted.

Furthermore, Applicants respectfully submit that what the Office characterizes as “intended use” claims are in fact structural claims configured to produce a desired result. Each independent claim, 53, 75, and 81, includes a structural limitation on how the apparatus is configured. Regardless of how the Office Action characterizes the claim language, the claim limitations are boundaries on the scope and breadth of the patent coverage. In the claims, the bias voltage modulator must be capable of providing the results claimed. For example, as noted above with respect to claim 53, the bias voltage modulator must be configured “modulate said first voltage being at a level which ensures the deposit of material onto a first location of a substrate supported by said electrode while a second location of said substrate is etched” and “said second voltage being at a level at which ensures that both first and second locations of said substrate are etched.”

In the Action mailed on December, 2006, the Office dismisses the inclusion of the “intended use” limitations in the claims. Applicants respectfully submit that the Federal Circuit in *Catalina Marketing Int’l, Inc. v. Coolsavings.com, Inc.*, 289 F.3d 801, 809, 62 U.S.P.Q.2d 1781 (Fed. Cir. 2002), has addressed this issue and confirmed that intended use limitations are not to be summarily dismissed from claim interpretation. The Court stated that whether to include limitations found in a pre-amble of a claim is a decision to be made on a case by case basis. However, when the Court analyzed the same claim limitation that was also found in the body of the claim, the Court proceeded to interpret the intended use limitation without any discussion beyond the Court stating that “[b]y virtue of its inclusion in the body of Claim 25, this phrase limits Claim 25.” *Catalina*, at 811. Thus, intended use claim limitations are to be interpreted as part of the claimed invention.

Applicants respectfully submit that the Office has incorrectly suggested that the intended use limitations are found in the pre-amble of claims. The claims limitations are found in the body of claims 53, 75, and 81 (as discussed more fully above). And as such, all limitations in claim should be interpreted.

Even if what the Office mistaken characterizes as the “intended use” limitations were in the pre-amble, which they are not, as a matter of law, “statements of intended use... may... limit apparatus claims...if the applicant clearly and unmistakably relied on those uses... to distinguish prior art.” Catalina Marketing Int'l, Inc. v. Coolsavings.com, Inc., 289 F.3d 801, 809, 62 U.S.P.Q.2d 1781 (Fed. Cir. 2002). This is the case here, because Applicants are relying on all of the claim limitations, including those deemed “intended use” by the Office Action, to distinguish over the prior art which fails to teach or suggest claim limitations.

Moreover, even if some limitations are deemed, mistakenly, to be intended use, they still serve to define the invention and cannot be ignored. Even if the Office Action considers that the “operating parameters claimed are intended use limitations” such limitations must be considered because the claims limitations “by virtue of their inclusion into the body of the claims, limit the claims.” *Catalina*, at 811.

As such, the Office must consider all of the limitations contained in claims 53, 75, and 81. Thus, claims 53, 75, and 81 are allowable over Collins for at least the reasons noted above.

Claims 53-61, 63 and 75-86 stand rejected under 35 U.S.C. 102(e) as being anticipated by Hopkins et al., (U.S. Patent No. 6,187,685) (“Hopkins”). This rejection is respectfully traversed.

Hopkins discloses a “method and apparatus for etching a substrate [which] comprises the steps of etching a substrate or alternately etching and depositing a passivation layer. A bias frequency, which may be pulsed, may be applied to the substrate and may be at or below the ion plasma frequency.” (Hopkins, Abstract)

The Office Action relied on “Col 10, lines 21-52 and Col 12, lines 54-67” of Hopkins for teaching “the application of bias voltage modulation for ARDE (Aspect Ratio Dependent Etching) and... etching of high aspect ration [sic] by alternatively etching and depositing.” Office Action, p. 4. The Office Action itself points out why Hopkins fails to teach or suggest the claimed invention by stating the Hopkins teaches “alternatively etching and depositing.”

In the claimed invention, claim 53 recites a modulator wherein at a first voltage material is deposited onto a first location “while” a second location is etched. As such, the rejection of claim 53 should be withdrawn and claim 53 and its dependant claims should be allowed over Hopkins for at least the reason noted.

Claim 75 recites a modulator wherein “material is deposited at a first position of said opening which has a first aspect ratio, while a second position of said opening having a second aspect ratio, different from said first aspect ratio, is etched.” As such, the rejection of claim 75 should be withdrawn and claim 75 and its dependant claims should be allowed over Hopkins for at least the reason noted.

Claim 81 recites a modulator that deposits material at a first position of an opening which has a first aspect ratio, “while” etching a second position of said opening which has a second aspect ratio.” As such, the rejection of claim 81 should be withdrawn and claim 81 and its dependant claims should be allowed over Hopkins for at least the reason noted.

Moreover, Hopkins fails to teach or suggest the different aspect ratios recited in the claims 76-80 and 82-86, which again are limitations for the configuration of the bias modulator. These arguments still have not been addressed by the Office.

Claim 62 stands rejected under 35 U.S.C. § 103 as being unpatentable over Collins in view of Hashimoto et al., U.S. Patent No. 5,779,925 ("Hashimoto"). This rejection is respectfully traversed.

Claim 62 depends from claim 53 which is allowable over Collins as discussed above.

Hashimoto discloses: a

method of manufacturing a semiconductor device including the steps of: (a) transporting a semiconductor wafer into a plasma process system, the semiconductor wafer having a semiconductor layer, a field insulating film and a gate insulating film formed on the semiconductor layer, said gate insulating film having a breakdown voltage of B (V) and a thickness of 10 nm or thinner, a conductive layer of a structured antenna formed on the gate insulating film and the field insulating film, the conductive layer having an antenna ratio of 500 or higher, and an insulating material pattern formed on the conductive layer, the insulating material pattern having an opening with an aspect ratio larger than 1; and (b) processing the semiconductor wafer in plasma having an electron temperature of Te (eV) equal to or less than B. With this method, it is possible to prevent damages to a gate insulating film even during a fine pattern process.

(Hashimoto, Abstract)

Hashimoto fails to cure the deficiencies of Collins to remedy its deficiencies with respect to claim 53, as Hashimoto does not disclose or teach a "bias voltage modulator configured to apply a modulated DC bias voltage to one of said supply source and said bias voltage which varies between a first voltage and a second voltage" where said first voltage being at a level which ensures the deposit of material onto a

first location of a substrate supported by said electrode while a second location of said substrate is etched" and "said second voltage being at a level at which ensures that both first and second locations of said substrate are etched." Thus, claim 62 is allowable together with its base claim.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

Dated: March 28, 2007

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